Synergies between SWOT and microwave soil moisture sensors SMOS

CNES TOSCA – SWOT - Hydro: Water and energy balance modeling

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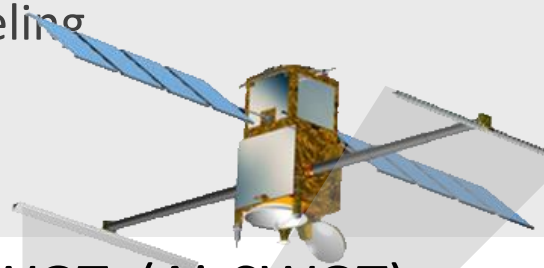


SMOS

SMAP

SWOT (AirSWOT)
2D observations of water height

Question: Will we enhance our knowledge of the water budget components by combining SWOT with other sensors ?

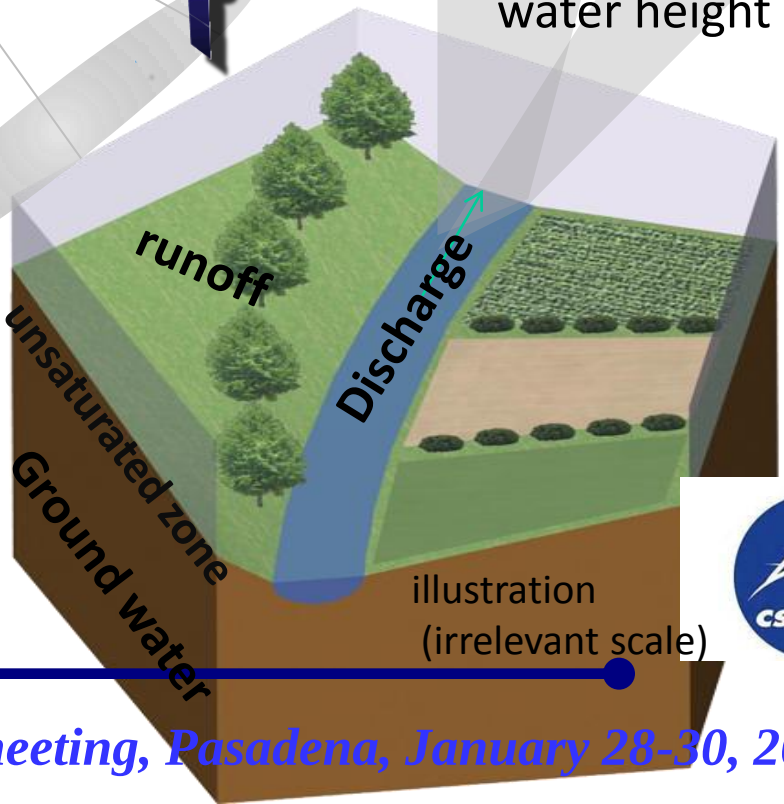


illustration (irrelevant scale)

1 - Objectives:

Enhance the evaluation of the water budget components

-Root zone soil moisture
(agricultural applications, drought …)

-Discharge
(water management & flood risk)

2 – Area of interest

- Adour-Garonne basin

- Upper-Mississippi basin

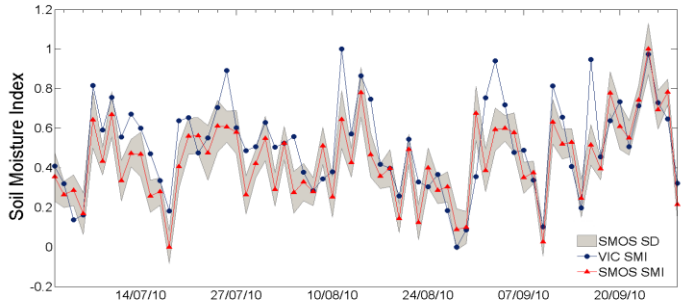
3 – Dataset

- SMOS : Soil moisture at 5 cm depth
- AirSWOT + simulated SWOT data
- High resolution land cover dataset from SPOT 4Take 5

4 – Methodology

Multi-sensor assimilation into integrated hydrologic modeling

Add the **SWOT simulator** into the SMOS+Hydro land data assimilation system (**EnKF, Radiative transfer model**, **ViC hydrologic model**, **routing model**)



Example of VIC outputs surface soil moisture and SMOS soil moisture over Upper Mississippi Basin

5- Expected results relevant to SWOT mission

- Are Surface/subsurface flows enhanced by the use of SWOT & SWOT data ?
- Is the root zone soil moisture enhanced by the use of SWOT data ?

Secondary objective – Coastal Areas

Question : What is the Impact of tidal effects on saltwater intrusion in coastal aquifers ?

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Time variable B.C. from processed SWOT data → Saltwater intrusion modeling → Dynamics of saltwater wedge